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Postsurgical wound infections due to rapidly growing mycobacteria in Swiss medical tourists following cosmetic surgery in Latin America between 2012 and 2014

F P Maurer (florian.maurer@imm.uzh.ch)^{1,2}, C Castelberg¹, A von Braun³, A Wolfensberger³, G V Bloemberg¹, E C Böttger^{1,2}, A Somoskovi^{1,2}

1. Institute for Medical Microbiology, University of Zurich, Zurich, Switzerland

2. National Reference Centre for Mycobacteria, University of Zurich, Zurich, Switzerland

3. Division for Infectious Diseases and Hospital Epidemiology, University Hospital Zurich, Zurich, Switzerland

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Between October 2012 and August 2014, several Swiss patients developed severe soft tissue infections due to rapidly growing mycobacteria following cosmetic surgery in the Dominican Republic, Ecuador and Mexico. Infections were caused by *Mycobacterium abscessus* (n=5), *Mycobacterium* sp. JAN1 (n=1) and *M. conceptionense* (n=1). Similar cases may have remained unrecognised due to a lack of notification requirements. Microbiological work-up of medical tourists with infections following cosmetic surgery should include rapidly growing mycobacteria.

Between October 2012 and August 2014, the Swiss National Reference Centre for Mycobacteria identified a series of severe healthcare-associated soft-tissue infections caused by rapidly growing mycobacteria (RGM) in seven female Swiss citizens who had undergone cosmetic surgery in the Dominican Republic, Ecuador and Mexico. Here we report the clinical presentation and microbiological findings and discuss possible implications for medical tourists and healthcare providers.

Case series

Between October 2012 and August 2014, seven previously healthy female patients sought medical advice at different hospitals in the German-, French- and Italian-speaking parts of Switzerland due to severe healthcare-associated infections following cosmetic surgery. All patients were Swiss citizens of Latin American descent between 19 and 52 years of age. The patients were not related to each other and there was no history of contact between them. All patients had recently undergone plastic surgery as medical tourists in the Dominican Republic (five patients), Ecuador (one patient) and Mexico (one patient). Surgical procedures performed were abdominal liposuction (two patients),

breast augmentation (two patients) and breast reduction with or without simultaneous abdominoplasty (three patients). The patients developed post-surgical wound infections with symptoms ranging from local inflammation to painful subcutaneous and severe deep tissue abscesses that failed to respond to initial antibiotic chemotherapy.

Microbiological investigations

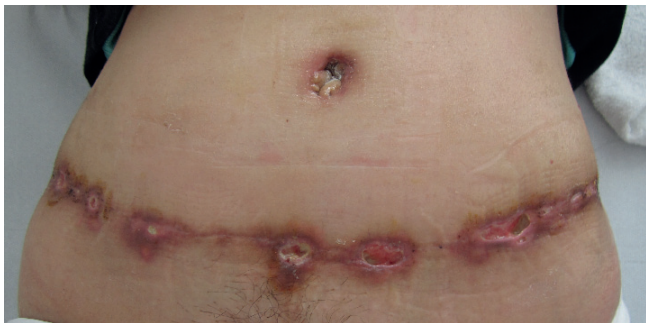
Microbiological cultures and 16S rRNA gene analyses performed on tissue biopsies or drainage fluid from the infected sites repeatedly identified RGM as the infectious agent, namely *Mycobacterium abscessus* subsp. *abscessus* (four patients), *M. abscessus* subsp. *massiliense* (one patient), *Mycobacterium* sp. JAN1 (closely related to *M. abscessus*, one patient) and *M. conceptionense* (*M. fortuitum* group, one patient) [1,2]. Drug susceptibility testing was performed according to standard procedures [3]. Minimal inhibitory concentrations (MICs) were as follows: amikacin 0.5–8.0 mg/L; clarithromycin <0.5 mg/L for *M. abscessus* subsp. *massiliense*, *Mycobacterium* sp. JAN1, and *M. conceptionense*, inducible resistance due to a functional Erm(41) methylase for three of the four *M. abscessus* subsp. *abscessus* isolates [4]; linezolid 1.0–16.0 mg/L; moxifloxacin 2.0–8.0 mg/L for *M. abscessus* spp. and *Mycobacterium* sp. JAN1, and 0.125 mg/L for *M. conceptionense*; doxycycline 64–>256 mg/L for *M. abscessus* spp. and *Mycobacterium* sp. JAN1, and <0.5 mg/L for *M. conceptionense*; tigecycline 0.5–8.0 mg/L.

Treatment

All infections required surgical revision in combination with multidrug antibiotic chemotherapy, and removal of breast implants in two patients. As only mycobacterial cultures isolated in different laboratories were referred to us and medical records were not available,

FIGURE 1

Purulent lesions following abdominoplasty at a medical centre in Ecuador, caused by *Mycobacterium abscessus* subsp. *abscessus*, Switzerland, October 2013



further details on administered antimicrobials and on outcome could not be obtained for six patients. One patient (Figures 1 and 2), for whom complete follow-up information was available, was treated with a combination of amikacin, linezolid and moxifloxacin following surgical resection and debridement. Macrolides were not administered because of an inducible resistance phenotype. Due to serious side effects, amikacin and linezolid were stopped after four and five weeks, respectively. Moxifloxacin was given for an additional week but was stopped thereafter, because of the risk of high-level resistance when given as monotherapy. Ten months later, the patient still had transitory nodular skin lesions. Histopathological analyses of three lesions showed granulomatous inflammation. However, microbiological cultures and PCR from corresponding specimens remained negative.

Transmission history

In order to identify possible transmission links between the four patients with confirmed *M. abscessus* subsp. *abscessus* infection, molecular typing was performed using both randomly amplified polymorphic DNA (RAPD) PCR and multilocus sequence typing (based on partial sequences of the *argH*, *cya*, *glpK*, *gnd*, *murC*, *pta*, and *purH* genes) [5,6]. A clonal relationship between the four *M. abscessus* subsp. *abscessus* isolates was excluded. In addition, available information did not indicate an association of the infections with one particular clinic. Several sources can be considered that may have been responsible for the infections such as contaminated rinsing fluids, gentian violet for marking skin incisions, injectable medications, antiseptic solutions, unsterile surgical instruments or poor wound aftercare, e.g. by using contaminated tap water to irrigate postoperative wounds [7-10]. The Swiss health authorities have been informed in order to conduct further epidemiological investigations and to contact the health authorities in the affected countries.

Background

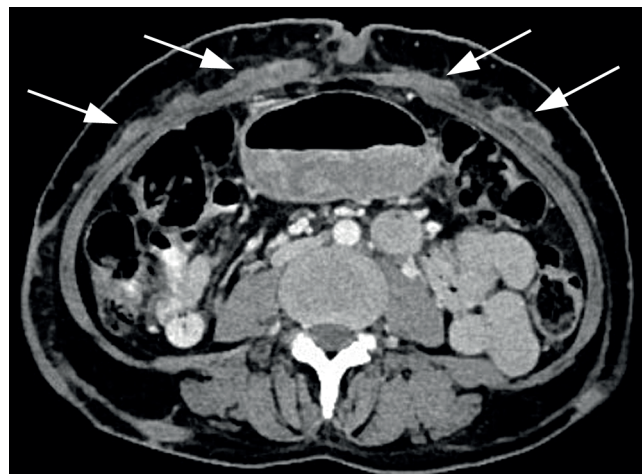
Similar to other RGM, *M. abscessus* can be isolated from a wide variety of environmental sources including water and soil [11,12]. *M. abscessus* is considered

an emerging pathogen causing severe infections in patients suffering from chronic pulmonary diseases, e.g. bronchiectasis and cystic fibrosis [13]. It has also been associated with infections following cosmetic procedures, e.g. tattooing [14], and with surgical wound infections, post-injection abscesses and healthcare-related outbreaks [15,16]. Antibiotic therapy of *M. abscessus* infections is challenging due to the organism's natural resistance to most clinically available antibiotics [17-19]. Studies on clinical outcome with respect to specific therapeutic regimens are scarce and mainly focus on pulmonary disease [20,21]. Antimicrobial chemotherapy of *M. abscessus* infections is guided by in vitro drug susceptibility testing results and should include a macrolide, e.g. clarithromycin or azithromycin, and an aminoglycoside, preferably amikacin [3,13,19]. Some *M. abscessus* isolates show an inducible macrolide resistance phenotype conferred by a ribosomal methylase, Erm(41), and the clinical efficacy of macrolides against such strains remains unclear [4]. Acquired high-level resistance to macrolides (MICs >256 mg/L), however, is due to mutations in the 23S ribosomal RNA gene [22-24]. For extensive extrapulmonary disease, administration of additional compounds, e.g. moxifloxacin, linezolid and/or tigecycline is recommended [13,15,17,19]. Surgical revision of the infected tissues is often necessary to reduce the bacterial load at the site of infection.

Other ubiquitous RGM species like *M. conceptionense*, a member of the *M. fortuitum* group, have also been reported to cause infections following medical or cosmetic procedures [15,25-27]. Treatment is generally more effective than against *M. abscessus* infections due to the less pronounced innate antibiotic resistance [28]. Thus, fluoroquinolones show comparably low MICs against species in the *M. fortuitum* group and

FIGURE 2

Abdominal computed tomography scan of a patient following abdominoplasty at a medical centre in Ecuador showing multifocal subcutaneous abscesses of the anterior abdominal wall, Switzerland, October 2013



doxycycline, a tetracycline antibiotic, is effective in vitro against about 50% of *M. fortuitum* group isolates [13,17].

Discussion

Previous studies described serious post-surgical complications due to *M. abscessus* infections following cosmetic surgery among 20 American 'lipotourists' in the Dominican Republic between 2003 and 2004 [29-31]. Part of the infections were caused by identical strains following surgical procedures performed at the same clinic, which led to an on-site investigation by national public health authorities. However, the cause for this outbreak has not been reported. A literature search did not reveal any reports on similar infections related to medical tourism to the Dominican Republic or other Latin American countries during the following years with the exception of a large *M. abscessus* outbreak affecting 311 patients who underwent various surgical procedures including mastopexy and liposuction in Belém (Brazil) between February 2004 and June 2005 [32]. A recent warning published by Schnabel et al. after 16 female United States residents underwent plastic surgery at eight clinics in the Dominican Republic between March 2013 and April 2014 [33] as well as our case series indicate that the problem is either unresolved or that a new source of RGM infections has emerged. Our observations highlight that cases are not restricted to the Dominican Republic and that patients residing outside the Americas are also affected.

Since RGM infections do not require compulsory reporting to public health authorities, the number of unreported cases may be considerable. We recommend that microbiological work-up of medical tourists with infections following cosmetic surgery should always include RGM. Furthermore, attending physicians should seek expert advice to timely prescribe antibiotic therapy and to prevent the emergence of drug-resistant subpopulations.

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Conflict of interest

None declared.

Authors' contributions

Microbiological investigations (FPM, GVB, ECB, AS), genotyping (CC, FPM, GVB), patient care (AVB, AW), Figures 1 and 2 (AVB, AW). The manuscript was prepared by FPM, AVB, GVB, ECB and AS.

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